

REMARKS

Claims 1-4 are pending in this application. An amendment is proposed amending claim 1 to correct a typographical error, as discussed below. Upon entry of the amendment, claims 1-4 will be pending.

Claims 1-4 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as their invention. (Office action paragraph no. 1)

The rejection is overcome by the amendment to claim 1, deleting the extra “(X)” in the formula. This “(X)” had been inadvertently added in the amendment dated April 13, 2005.

Claims 1-4 are rejected under 35 U.S.C. §103(a) as being unpatentable over Helmeke et al. ('073) in view of Lee et al.('793) or Oertel. (Office action paragraphs no. 3-5)

Reconsideration of the rejection is respectfully requested.

The Examiner states that it is obvious to incorporate a sulfonic acid into the urethane prepolymer obtained from a polyester polyol having an aromatic ring for improving the thermal stability of the solvent-free moisture-curable hot melt urethane resin composition in view of Helmeke et al., Lee et al., and Oertel.

However, Applicant again submits that the effects of the present invention are **unexpected** over the cited art, as evidenced by the data in the Declaration under 37 CFR 1.132 filed with the Amendment dated April 13, 2005. Specifically, it is completely unexpected in view of Helmeke et

al., Lee et al., and Oertel, that the thermal stability of the obtained composition is improved by incorporating the sulfonic acid into the urethane prepolymer obtained from a polyester polyol having an aromatic ring.

Applicant refers to the Declaration under 37 CFR 1.132, filed April 13, 2005, as follows.
First, Comparative Examples 1 and 2 are compared:

Comparative example 1: Composition having a urethane prepolymer without an aromatic ring, and a morpholine ether-based crosslinking catalyst.

Comparative example 2: Composition having a urethane prepolymer without an aromatic ring, a morpholine ether-based crosslinking catalyst, and a sulfonic acid. (Note: “methane sulfonate” in the Declaration refers to “methane sulfonic acid”).)

That is, Comparative example 2 is prepared by incorporating a sulfonic acid (methane sulfonic acid) as a stabilizer into the composition of Comparative example 1.

By comparing Comparative example 1 and Comparative example 2 as shown in the following Table, it is found that the incorporation of the sulfonic acid causes a decline in the melting viscosity, therefore improving the thermal stability.

Thermal stability Melt viscosity (mPa·s, 125°C)	Comparative Example 1	Comparative Example 2	Decline
Initial	9000 mPa·s	7000 mPa·s	23%
After 18 hours	9400 mPa·s	8100 mPa·s	14%
After 36 hours	10300 mPa·s	9600 mPa·s	7%

This is the effect **expected** from use of a stabilizer. However, the decline in thermal stability between Comparative example 1 and Comparative example 2 decreases (23% → 7%) with time. Therefore, even if a sulfonic acid is incorporated into a conventional composition, the effect of the thermal stability by the sulfonic acid decreases with time.

Now, the effect of Example 1 of the present invention is explained by comparing Comparative example 3 and Example 1, as follows:

Comparative example 3: Composition having a urethane prepolymer having an aromatic ring, and a morpholine ether-based crosslinking catalyst.

Example 1: Composition having a urethane prepolymer having an aromatic ring, a morpholine ether-based crosslinking catalyst, and a sulfonic acid.

Comparative example 3 and Example 1 are compared as in the following Table. It can be seen that the incorporation of the sulfonic acid causes a **more significant decline** in the melting viscosity than the decline in the melting viscosity seen between Comparative example 1 and Comparative example 2.

Thermal stability Melt viscosity (mPa·s, 125°C)	Comparative Example 3	Example 1	Decline
Initial	14000 mPa·s	12000 mPa·s	15%
After 18 hours	22000 mPa·s	14000 mPa·s	37%
After 36 hours	Gelled	22000 mPa·s	-

Moreover, even as time passes, the solvent-free moisture-curable hot melt urethane resin composition of Example 1 **maintains a sufficient level of thermal stability** for practical use.

This effect--that the decline in the melting viscosity is restrained as shown above--is **unexpected** based on the ability of the sulfonic acid to act as the stabilizer in the conventional technology (without an aromatic ring) of Comparative example 1 and Comparative example 2. That is, this effect is **unexpected** based on the cited prior art.

That is, as Applicant has argued previously, the observed effect of the present invention requires 1) the polyester polyol made using phthalic acid, isotphthalic acid or terephthalic acid; 2) the morpholine-based crosslinking agent; and 3) the sulfonic or sulfinic acid. That is, there is a **synergy** of these **three** parameters in the effect; such a synergy would not be expected based on the general inhibitory effect of methanesulfonic acid noted in the prior art. Applicant submits that this synergy is completely unexpected over the prior art.

Applicant therefore submits that claims 1-4 are not obvious over Helmeke et al. ('073), Lee et al.('793), and Oertel, taken separately or in combination.

In view of the aforementioned amendments and accompanying remarks, the claims, as amended, are in condition for allowance, which action, at an early date, is requested.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact Applicant's undersigned agent at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

In the event that this paper is not timely filed, Applicant respectfully petitions for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

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